Docket No.: 09852/000N062-US0
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Letters Patent of:
Katsuaki Hosono

Patent No.: 7,118,359

Issued: October 10, 2006

For: OIL PUMP ROTOR

REQUEST FOR CERTIFICATE OF CORRECTION
PURSUANT TO 37 CFR 1.322

Attention: Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Upon reviewing the above-identified patent, Patentee noted typographical errors which should be corrected. A listing of the errors to be corrected is attached.

The typographical errors marked with a "P" on the attached list are not in the application as filed by applicant. Also given on the attached list are the documents from the file history of the subject patent where the correct data can be found.

The errors now sought to be corrected are inadvertent typographical errors the correction of which does not involve new matter or require reexamination.

Transmitted herewith is a proposed Certificate of Correction effecting such corrections. Patentee respectfully solicits the granting of the requested Certificate of Correction.

No fee is believed to be due for the filing of this Request. The Commissioner is authorized to charge any deficiency of up to $300.00 or credit any excess in this fee to Deposit Account No. 04-0100.

Dated: May 15, 2008

Respectfully submitted,

By______________________

Flynn Barrison
Registration No.: 53,970
DARBY & DARBY P.C.
P.O. Box 770
Church Street Station
New York, New York 10008-0770
(212) 527-7700
(212) 527-7701 (Fax)
Attorneys/Agents For Applicant

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,118,359

APPLICATION NO. : 10/622,107

ISSUE DATE : October 10, 2006

INVENTOR(S) : Katsuaki Hosono

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Column 33, lines 58 approximately, in claim 6, after “distance” delete “60” and insert --α--

In Column 35, lines 58 approximately, in claim 15, after “claim” delete “8,” and insert --10,--

In Column 35, lines 63 approximately, in claim 16, after “claim” delete “8,” and insert --10,--

In Column 38, lines 17 approximately, in claim 24, after “claim” delete “15” and insert --19--

MAILING ADDRESS OF SENDER (Please do not use customer number below):
Joseph R. Robinson, Esq.
DARBY & DARBY P.C.
P.O. Box 770
Church Street Station
New York, New York 10008-0770

Darby & Darby

Issued Patent Proofing Form **File#: 09852/000N062-US0**
Note: P = PTO Error **A = Applicant Error**

US Serial No.: 10/622,107 **US Patent No.: US 7,118,359 B2** **Issue Dt.: Oct. 10, 2006**
Title: **OIL PUMP MOTOR**

Sr. No.	P/A	Original		Issued Patent		Description Of Error
		Page	Line	Column	Line	
1	P			33	58	In claim 6, after "distance" delete "60" and insert --α--
2	P			35	58	In claim 15, after "claim" delete "8," and insert --10,--
3	P			35	63	In claim 16, after "claim" delete "8," and insert --10,--
4	P			38	17	In claim 24, after "claim" delete "15" and insert --19--

port for drawing fluid and a discharge port for discharging fluid, and which conveys fluid by drawing and discharging fluid by volume change of cells formed between tooth surfaces of the inner rotor and the outer rotor during relative rotation between the inner rotor and the outer rotor engaging each other,

wherein each of the tooth profiles of the outer rotor is formed such that the tooth space profile thereof is formed using an epicycloid curve which is generated by rolling a circumscribed-rolling circle Ao along a base circle Do without slip, and the tooth tip profile thereof is formed using a hypocycloid curve which is generated by rolling an inscribed-rolling circle Bo along the base circle Do without slip,

wherein the tooth space profile of the inner rotor is formed based on a hypocycloid curve which is formed by rolling an inscribed-rolling circle Bi along a base circle Di without slip,

wherein the tooth tip profile of the inner rotor is formed such that an epicycloid curve, which is generated by rolling a circumscribed-rolling circle Ai along the base circle Di without slip, is equally divided into two at a midpoint thereof to obtain two outer tooth curve segments, and the two outer tooth curve segments are separated by a predetermined distance and are smoothly connected to each other using a curve or a straight line, and

wherein the predetermined distance between the two outer tooth curve segments is designated by "α", and the tip clearance is designated by "t", "α" is set so as to satisfy the following inequalities:

$$t/4 \leqq \alpha \leqq 3t/4.$$

2. An oil pump rotor assembly according to claim 1, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are moved along the circumference of the base circle Di.

3. An oil pump rotor assembly according to claim 1, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are moved in the direction of a tangent of the epicycloid curve drawn at the midpoint thereof.

4. An oil pump rotor assembly according to claim 1, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are first moved along the circumference of the base circle Di, and then moved in the direction of a tangent of the epicycloid curve drawn at the midpoint thereof.

5. An oil pump rotor assembly according to claim 1, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are first moved in the direction of a tangent of the epicycloid curve drawn at the midpoint thereof, and then moved along the circumference of the base circle Di.

6. An oil pump rotor assembly according to claim 1, wherein the predetermined distance "60 " is set so as to satisfy the following inequalities:

"α"

$$2t/5 \leqq \alpha \leqq 3t/5.$$

7. An oil pump rotor assembly according to claim 1, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi+t/2=øAo;$$

$$øBi-t/2=øBo;$$

$$øAi+øBi=øAo+øBo=2e;$$

$$øDi=n\cdot(øAi+øBi);$$

$$øDo=(n+1)\cdot(øAo+øBo);\ \text{and}$$

$$(n+1)\cdot øDi=n\cdot øDo,$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

8. An oil pump rotor assembly according to claim 1, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi+t/(n+2)=øAo;$$

$$øBi=øBo;$$

$$øAi+øBi=2e;$$

$$øDi=n\cdot(øAi+øBi);\ \text{and}$$

$$øDo=øDi\cdot(n+1)/n+t\cdot(n+1)/(n+2),$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

9. An oil pump rotor assembly according to claim 1, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi=øAo;$$

$$øBi+t/(n+2)=øBo;$$

$$øAi+øBi=2e;$$

$$øDi=n\cdot(øAi+øBi);\ \text{and}$$

$$øDo=øDi\cdot(n+1)/n+t\cdot(n+1)/(n+2),$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

10. An oil pump rotor assembly comprising:

an inner rotor having "n" external teeth ("n" is a natural number);

an outer rotor having (n+1) internal teeth which are engageable with the external teeth; and

the distance between an apex of an outer tooth of the inner rotor and an apex of an inner tooth of the outer rotor when the apexes oppose each other defining a tip clearance therebetween,

wherein the oil pump rotor assembly is used in an oil pump which further includes a casing having a suction port for drawing fluid and a discharge port for discharging fluid, and which conveys fluid by drawing and discharging fluid by volume change of cells formed between tooth surfaces of the inner rotor and the outer rotor during relative rotation between the inner rotor and the outer rotor engaging each other,

wherein each of the tooth profiles of the inner rotor is formed such that the tooth tip profile thereof is formed using an epicycloid curve which is generated by rolling a circumscribed-rolling circle Ai along a base circle Di without slip, and the tooth space profile thereof is formed using a hypocycloid curve which is generated by rolling an inscribed-rolling circle Bi along the base circle Di without slip,

wherein the tooth space profile of the outer rotor is formed based on an epicycloid curve which is formed by rolling a circumscribed-rolling circle Ao along a base circle Do without slip,

wherein the tooth tip profile of the outer rotor is formed such that a hypocycloid curve, which is generated by rolling an inscribed-rolling circle Bo along the base circle Do without slip, is equally divided into two at a midpoint thereof to obtain two inner tooth curve segments, and the two inner tooth curve segments are separated by a predetermined distance and are smoothly connected to each other using a curve or a straight line, and

wherein the predetermined distance between the two inner tooth curve segments is designated by "β", and the tip clearance is designated by "t", "β" is set so as to satisfy the following inequalities:

$$t/4 \leqq \beta \leqq 3t/4.$$

11. An oil pump rotor assembly according to claim 10, wherein the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are moved along the circumference of the base circle Do.

12. An oil pump rotor assembly according to claim 10, wherein the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are moved in the direction of a tangent of the hypocycloid curve drawn at the midpoint thereof.

13. An oil pump rotor assembly according to claim 10, wherein the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are first moved along the circumference of the base circle Do, and then moved in the direction of a tangent of the hypocycloid curve drawn at the midpoint thereof.

14. An oil pump rotor assembly according to claim 10, wherein the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are first moved in the direction of a tangent of the hypocycloid curve drawn at the midpoint thereof, and then moved along the circumference of the base circle Do.

15. An oil pump rotor assembly according to claim 8, wherein the predetermined distance "β" is set so as to satisfy the following inequalities:

10

$$2t/5 \leqq \alpha \leqq 3t/5.$$

16. An oil pump rotor assembly according to claim 8, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi+t/2=øAo;$$

$$øBi-t/2=øBo;$$

$$øAi+øBi=øAo+øBo=2e;$$

$$øDi=n\cdot(øAi+øBi);$$

$$øDo=(n+1)\cdot(øAo+øBo);\ \text{and}$$

$$(n+1)\cdot øDi=n\cdot øDo,$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

17. An oil pump rotor assembly according to claim 10, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi+t/(n+2)=øAo;$$

$$øBi=øBo;$$

$$øAi+øBi=2e;$$

$$øDi=n\cdot(øAi+øBi);\ \text{and}$$

$$øDo=øDi\cdot(n+1)/n+t\cdot(n+1)/(n+2),$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

18. An oil pump rotor assembly according to claim 10, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi=øAo;$$

$$øBi+t/(n+2)=øBo;$$

$$øAi+øBi=2e;$$

$$øDi=n\cdot(øAi+øBi);\ \text{and}$$

$$øDo=øDi\cdot(n+1)/n+t\cdot(n+1)/(n+2),$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

19. An oil pump rotor assembly comprising:

an inner rotor having "n" external teeth ("n" is a natural number); an outer rotor having (n+1) internal teeth which are engageable with the external teeth; and

the distance between an apex of an outer tooth of the inner rotor and an apex of an inner tooth of the outer rotor when the apexes oppose each other defining a tip clearance therebetween,

wherein the oil pump rotor assembly is used in an oil pump which further includes a casing having a suction port for drawing fluid and a discharge port for discharging fluid, and which conveys fluid by drawing and discharging fluid by volume change of cells formed between tooth profiles of the inner rotor and the outer rotor during relative rotation between the inner rotor and the outer rotor engaging each other,

wherein the tooth tip profile of the inner rotor is formed such that an epicycloid curve, which is generated by rolling a circumscribed-rolling circle Ai along a base circle Di without slip, is equally divided into two at a midpoint thereof to obtain two outer tooth curve segments, and the two outer tooth curve segments are separated by a predetermined distance and are smoothly connected to each other using a curve or a straight line,

wherein the tooth space profile of the inner rotor is formed based on a hypocycloid curve which is formed by rolling an inscribed-rolling circle Bi along the base circle Di without slip,

wherein the tooth space profile of the outer rotor is formed based on an epicycloid curve which is formed by rolling a circumscribed-rolling circle Ao along a base circle Do without slip,

wherein the tooth tip profile of the outer rotor is formed such that a hypocycloid curve, which is generated by rolling an inscribed-rolling circle Bo along the base circle Do without slip, is equally divided into two at a midpoint thereof to obtain two inner tooth curve segments, and the inner tooth curve segments are separated by a predetermined distance and are smoothly connected to each other using a curve or a straight line, and

wherein the predetermined distance between the two outer tooth curve segments is designated by "α", the predetermined distance between the two inner tooth curve segments is designated by "β", and the tip clearance is designated by "t", "α" and "β" are set so as to satisfy the following inequalities:

$$t/4 \leqq \alpha \leqq 3t/4; \text{ and}$$

$$t/4 \leqq \beta \leqq 3t/4.$$

20. An oil pump rotor assembly according to claim **19**, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are moved along the circumference of the base circle Di, and the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are moved along the circumference of the base circle Do.

21. An oil pump rotor assembly according to claim **19**, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are moved in the direction of a tangent of the epicycloid curve drawn at the midpoint thereof, the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are moved in the direction of a tangent of the hypocycloid curve drawn at the midpoint thereof.

22. An oil pump rotor assembly according to claim **19**, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are first moved along the circumference of the base circle Di, and then moved in the direction of a tangent of the epicycloid curve drawn at the midpoint thereof, and the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are first moved along the circumference of the base circle Do, and then moved in the direction of a tangent of the hypocycloid curve drawn at the midpoint thereof.

23. An oil pump rotor assembly according to claim **19**, wherein the separation of the two outer tooth curve segments is performed in such a manner that the two outer tooth curve segments are first moved in the direction of a tangent of the epicycloid curve drawn at the midpoint thereof, and then moved along the circumference of the base circle Di, and the separation of the two inner tooth curve segments is performed in such a manner that the two inner tooth curve segments are first moved in the direction of a tangent of the hypocycloid curve drawn at the midpoint thereof, and then moved along the circumference of the base circle Do.

24. An oil pump rotor assembly according to claim **15**, 19 wherein the predetermined distance "α" and the predetermined distance "β" are set so as to satisfy the following inequalities:

$$2t/5 \leqq \alpha \leqq 3t/5;$$

and

$$2t/5 \leqq \beta \leqq 3t/5.$$

25. An oil pump rotor assembly according to claim **19**, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi+t/2=øAo;$$

$$øBi-t/2=øBo;$$

$$øAi+øBi=øAo+øBo=2e;$$

$$øDi=n\cdot(øAi+øBi);$$

$$øDo=(n+1)\cdot(øAo+øBo); \text{ and}$$

$$(n+1)\cdot øDi=n\cdot øDo,$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of the inscribed-rolling circle Bo, "e" is an eccentric distance between the inner rotor and the outer rotor, and "t" is a tip clearance.

26. An oil pump rotor assembly according to claim **19**, wherein the inner rotor and the outer rotor are formed such that the following equations are satisfied:

$$øAi+t/(n+2)=øAo;$$

$$øBi=øBo;$$

$$øAi+øBi=2e;$$

$$øDi=n\cdot(øAi+øBi); \text{ and}$$

$$øDo=øDi\cdot(n+1)/n+t\cdot(n+1)/(n+2),$$

where, øDi is the diameter of the base circle Di of the inner rotor, øAi is the diameter of the circumscribed-rolling circle Ai, øBi is the diameter of the inscribed-rolling circle Bi, øDo is the diameter of the base circle Do of the outer rotor, øAo is the diameter of the circumscribed-rolling circle Ao, øBo is the diameter of